Structural and Cyclical Forces in the Labor Market During the Great Recession: Cross-Country Evidence

Luca Sala
Università Bocconi, IGIER and Baffi Center

Ulf Soderstrom
Sveriges Riksbank and CEPR

Antonella Trigari
Università Bocconi, CEPR, IGIER and Baffi Center

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Output and unemployment in four countries

(a) US

(b) UK

(c) Sweden

(d) Germany
Okun’s law in four countries, 1995-2011
Beveridge curves in four countries, 1995-2011
The issues

- What happened during the financial crisis and the Great Recession?
- What explains cross-country differences in output, unemployment, and vacancies?
- What is the role of structural and cyclical forces?
This paper

- Estimate loglinear monetary business cycle model with search frictions and nominal price and wage rigidities
- Unified framework, four countries: US, UK, Sweden, Germany
- Estimate until 2007Q1, study 2007Q2-2011Q3

Cyclical forces:
- What shocks characterize 2007-2011?
- Are these shocks different compared with pre-2007?
- How do these patterns differ across countries?

Structural forces:
- How do parameters differ across countries?
- Counterfactual: what if Germany had been more like the US?
The model
Model overview

- Quantitative monetary business cycle model with unemployment as in Gertler, Sala and Trigari (2008)
  - Non-labor market features as in Christiano et al. (2005) and Smets and Wouters (2007): price stickiness, habit formation in consumption, investment adjustment costs, capital utilization
  - Unemployment via search and matching frictions
  - Staggered Nash bargaining as in Gertler and Trigari (2009), but bargaining in nominal terms with indexing to past inflation
- Generalized hiring cost function: recruiting and training costs
- Two new shocks:
  - Risk premium shock (instead of discount factor shock)
  - Matching efficiency shock
The risk premium shock

- Household return on nominal bonds $B_t$:
  \[
  \frac{B_t}{p_t \varepsilon^b_t r_t}
  \]

- $\varepsilon^b_t$ "risk premium shock", exogenous wedge (spread) between risk-free rate $r_t$ and return on household portfolio

- Captures disruptions in financial markets, similar to net-worth shock in Bernanke, Gertler and Gilchrist (1999)

- Drives consumption and investment in the same direction
The matching efficiency shock

- Matching function:

\[ m_t = \varepsilon_t^m u_t^\sigma v_t^{1-\sigma} \]

- \( \varepsilon_t^m \) shock to the matching efficiency
- Captures time-varying efficiency in labor market matching
- Drives unemployment and vacancies in the same direction (explain shifts the Beveridge curve)
Generalized hiring costs

- Generalized (quadratic) hiring costs:

\[ \frac{\kappa}{2} \left( \frac{q_t^{1 - \frac{\eta_q}{2}} v_{it}}{n_{it-1}} \right)^2 n_{it-1} \]

- \( q_t \) = job filling rate and \( v_{it} \) = firm \( i \) vacancies

- \( \eta_q \in [0, 2] \) determines weight on recruiting costs
  - \( \eta_q = 0 \) \( \Rightarrow \) only training costs \( \Rightarrow \) \( \frac{\kappa}{2} \left( \frac{q_t v_{it}}{n_{it-1}} \right)^2 n_{it-1} \)
  - \( \eta_q = 2 \) \( \Rightarrow \) only recruiting costs \( \Rightarrow \) \( \frac{\kappa}{2} \left( \frac{v_{it}}{n_{it-1}} \right)^2 n_{it-1} \)
Monetary policy

\[
\frac{r_t}{r} = \left( \frac{r_{t-1}}{r} \right)^{\rho_s} \left[ \left( \frac{E_t \pi_{t+1}}{\pi} \right)^{r_\pi} \left( \frac{y_t}{y^n_t} \right)^{r_y} \right]^{1-\rho_s} \varepsilon_t^r
\]
Limitations

- Constant separation rate
- No intensive margin of labor
- No external sector
Estimation
Estimation

- Estimate log-linearized model with Bayesian techniques
- Quarterly data: GDP, Consumption, Investment, Real wage, Inflation, Interest rate, Unemployment, Vacancies
- Shocks: non-stationary technology, risk premium, monetary policy, investment, government + net export, price markup, bargaining power, matching efficiency
- Measurement error on real wages
- Parameters: estimate 22 parameters + parameters characterizing shocks and measurement error
- Samples: US 82Q1-07Q1, UK 95Q1-07Q1, Sweden 95Q1-07Q1, Germany 92Q1-07Q1
# Labor market parameters

US more fluid, Germany more sclerotic

<table>
<thead>
<tr>
<th>Parameter</th>
<th>US</th>
<th>UK</th>
<th>Sweden</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calibrated</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matching function elasticity $\sigma$</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Separation rate $1-\rho$</td>
<td>0.103</td>
<td>0.03</td>
<td>0.05</td>
<td>0.016</td>
</tr>
<tr>
<td>Job finding rate $s$</td>
<td>0.625</td>
<td>0.283</td>
<td>0.392</td>
<td>0.146</td>
</tr>
<tr>
<td><strong>Estimated</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workers bargaining power $\eta$</td>
<td>0.90</td>
<td>0.78</td>
<td>0.79</td>
<td>0.76</td>
</tr>
<tr>
<td>Unemployment flow value $b$</td>
<td>0.73</td>
<td>0.90</td>
<td>0.86</td>
<td>0.54</td>
</tr>
<tr>
<td>Weight on recruiting costs $\eta_q$</td>
<td>0.49</td>
<td>0.16</td>
<td>0.10</td>
<td>1.18</td>
</tr>
<tr>
<td>Wage stickiness parameter $\lambda_w$</td>
<td>0.68</td>
<td>0.66</td>
<td>0.70</td>
<td>0.74</td>
</tr>
<tr>
<td>Wage indexing parameter $\gamma_w$</td>
<td>0.15</td>
<td>0.13</td>
<td>0.11</td>
<td>0.13</td>
</tr>
</tbody>
</table>
Interpreting the Financial Crisis and the Great Recession
Shocks during crisis and recession in the US

Increased risk premium, reduced matching efficiency, increased monetary policy
Shocks during crisis and recession in Germany
Reduced investment, technology and bargaining power, but increased matching efficiency
Explaining GDP in the US

Increased risk premium, reduced investment and matching efficiency
Explaining GDP in Germany

Reduced technology and investment
Explaining unemployment in the US
Increased risk premium, reduced matching efficiency
Explaining unemployment in Germany
Reduced bargaining power, increased matching efficiency
Decomposing the Beveridge curve in the US
Reduced matching efficiency shifts BC out, other shocks create loops

Diagram showing various plots related to economic variables such as risk premium, monetary, investment, G+NX, technology, price markup, bargaining power, matching efficiency, and data.
Decomposing the Beveridge curve in Germany

Increased matching efficiency shifts BC in
Counterfactual: what if Germany had been more like the US?
Germany with US labor market

Similar output, but more volatile unemployment
Conclusions
Cyclical forces differ across countries

- Shocks to financial factors and matching efficiency important in the US during the Great Recession. Explain low output growth and vacancies, persistently high unemployment, and shift in Beveridge curve.

- In Germany reduced technology and investment shocks explain fall in output, financial factors not important, matching efficiency improved.

- Labor market shocks explain unemployment and vacancies in Germany.
Structural forces matter

- German labor market more sclerotic than US, weaker labor market flows
- But labor market reforms may change this
- Unemployment would have been more volatile with US labor market structure
Possible extensions

- Model
  - Intensive margin
  - Time-varying separation
  - External sector and investment-export linkages

- Further analysis
  - Better understanding of differences, need more detailed studies (Institutions, e.g., labor market reforms in Germany)
  - Micro-foundations of time-varying matching efficiency (skill or geographical mismatch, time-varying search intensity by firms and workers)
  - Feedback effects between unemployment risk, precautionary savings, aggregate demand and job creation
  - Role of unemployment benefits over the cycle (job search incentives, insurance, redistribution)
Thank you
Extra slides
Related literature

- Justiniano and Michelacci (2012): estimate real DSGE model with search frictions on six countries, focus on technology shocks

- Galì, Smets and Wouters (2012): interpret Great Recession and slow recovery in the US with estimated DSGE model without search frictions


- Christiano, Trabandt, and Walentin (2011): small open economy model with similar labor market structure, financial frictions, estimated on Swedish data
Figure 3. Historical shifts in the Beveridge curve.

Figure 4. Estimated long-run Job Creation curve

Source: Daly, Hobijn, Sahin, and Valletta (2011)
Output, unemployment, labor productivity and labor share in four countries
Variance decomposition

Y and U driven by the same shocks in US, disconnect in Germany

<table>
<thead>
<tr>
<th>Shocks</th>
<th>US</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta Y$</td>
<td>$U$</td>
</tr>
<tr>
<td>Risk premium</td>
<td>24</td>
<td>30</td>
</tr>
<tr>
<td>Monetary Policy</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Investment</td>
<td>19</td>
<td>41</td>
</tr>
<tr>
<td>Govt &amp; net exports</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Technology</td>
<td>39</td>
<td>19</td>
</tr>
<tr>
<td>Price markup</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bargaining power</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Matching efficiency</td>
<td>1</td>
<td>2</td>
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</table>
Variance decomposition

Similar to US, but govt. + net exports and monetary policy more important

<table>
<thead>
<tr>
<th>Shocks</th>
<th>UK</th>
<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta Y$</td>
<td>$U$</td>
</tr>
<tr>
<td>Risk premium</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td>Monetary Policy</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Investment</td>
<td>8</td>
<td>45</td>
</tr>
<tr>
<td>Govt &amp; net exports</td>
<td>37</td>
<td>9</td>
</tr>
<tr>
<td>Technology</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td>Price markup</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bargaining power</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Matching efficiency</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Estimated shocks, Sweden
Decomposing GDP, 2007-2011
Decomposing unemployment, 2007-2011
Decomposing vacancies, 2007-2011

(a) US

(b) UK

(c) Sweden

(d) Germany
Decomposing the real wage, 2007-2011
Decomposing Okun’s law, US 2007-2011
Decomposing Okun’s law, UK 2007-2011
Decomposing Okun’s law, Sweden 2007-2011
Decomposing Okun’s law, Germany 2007-2011
Decomposing the Beveridge curve, UK 2007-2011
Decomposing the Beveridge curve, Sweden 2007-2011
Germany 1992Q1-2011Q3

- GDP
- Investment
- Consumption
- Real wage
- Inflation
- Interest rate
- Unemployment
- Vacancies